

- 1 (a) Write 2.46×10^6 as an ordinary number.

$$\begin{array}{l} 2.46 \ 0000 \leftarrow \times 10 \text{ six times} \\ = 2460 \ 000 \quad (1) \end{array}$$

$$\begin{array}{r} 2460 \ 000 \\ \hline (1) \end{array}$$

- (b) Write 0.00074 in standard form.

$$\begin{array}{l} 0.00074 \leftarrow 4 \text{ times} \\ = 7.4 \times 10^{-4} \quad (1) \end{array}$$

$$\begin{array}{r} 7.4 \times 10^{-4} \\ \hline (1) \end{array}$$

- (c) Work out $(5.6 \times 10^6) + (2.3 \times 10^5)$

$$\begin{array}{l} (5.6 \times 10^6) + (2.3 \times 10^5) \\ = (56 \times 10^5) + (2.3 \times 10^5) \leftarrow \text{convert to } 10^5 \\ = (56 + 2.3) \times 10^5 \\ = 58.3 \times 10^5 \quad (1) \\ = 5.83 \times 10^6 \quad (1) \leftarrow \text{convert back to } 10^6 \text{ for standard form} \end{array}$$

$$\begin{array}{r} 5.83 \times 10^6 \\ \hline (2) \end{array}$$

(Total for Question 1 is 4 marks)

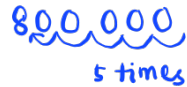
- 2 (a) Write 5.7×10^{-3} as an ordinary number.

0 . 0 0 5 . 7


0.0057 (1)

 (1)

- (b) Write 800 000 in standard form.

800 000

 5 times

8.0×10^5 (1)

 (1)

- (c) Work out $\frac{3 \times 10^5 - 2.7 \times 10^4}{6 \times 10^{-2}}$

$$3 \times 10^5 \rightarrow 30 \times 10^4$$

$$\frac{30 \times 10^4 - 2.7 \times 10^4}{6 \times 10^{-2}} = \frac{(30 - 2.7) \times 10^4}{6 \times 10^{-2}}$$

$$= \frac{273\,000}{0.06} \quad (1)$$

$$= 4550\,000 \quad (1)$$

4550 000

 (2)

(Total for Question 2 is 4 marks)

3 The table shows information about the surface area of each of the world's oceans.

| Ocean | Surface area in square kilometres |
|----------|-----------------------------------|
| Pacific | 1.56×10^8 |
| Indian | 6.86×10^7 |
| Southern | 2.03×10^7 |
| Arctic | 1.41×10^7 |
| Atlantic | 1.06×10^8 |

- (a) Work out the difference, in square kilometres, between the surface area of the Atlantic Ocean and the surface area of the Indian Ocean.
Give your answer in standard form.

$$\text{Atlantic} : 1.06 \times 10^8 = 10.6 \times 10^7 \quad (1)$$

$$\text{Indian} : 6.86 \times 10^7$$

$$\begin{aligned} & 10.6 \times 10^7 - 6.86 \times 10^7 \\ &= (10.6 - 6.86) \times 10^7 \\ &= 3.74 \times 10^7 \quad (1) \end{aligned}$$

$$\begin{aligned} & 3.74 \times 10^7 \text{ square kilometres} \\ & \quad (2) \end{aligned}$$

The surface area of the Pacific Ocean is k times the surface area of the Arctic Ocean.

- (b) Work out the value of k .
Give your answer correct to the nearest whole number.

$$\text{Pacific} : 1.56 \times 10^8 = 15.6 \times 10^7$$

$$\text{Arctic} : 1.41 \times 10^7$$

$$\text{Pacific} = k \times \text{Arctic}$$

$$k = \frac{\text{Pacific}}{\text{Arctic}} = \frac{15.6 \times 10^7}{1.41 \times 10^7}$$

$$= 11 \quad (1)$$

$$k = 11 \quad (1)$$

(Total for Question 3 is 3 marks)

- 4 (a) Write 7.8×10^{-4} as an ordinary number.

$$0.00078$$

$$0.00078$$

(1)

(1)

- (b) Work out $\frac{5.6 \times 10^4 + 7 \times 10^3}{2.8 \times 10^{-3}}$

Give your answer in standard form.

$$5.6 \times 10^4 \rightarrow 56 \times 10^3$$

$$\frac{56 \times 10^3 + 7 \times 10^3}{2.8 \times 10^{-3}} \quad (1)$$

$$= \frac{63 \times 10^3}{2.8 \times 10^{-3}}$$

$$= 2.25 \times 10^7 \quad (1)$$

$$2.25 \times 10^7$$

(2)

(Total for Question 4 is 3 marks)

5 The table shows the populations of five countries.

| Country | Population |
|---------|-------------------|
| China | 1.4×10^9 |
| Germany | 8.2×10^7 |
| Sweden | 9.9×10^6 |
| Fiji | 9.1×10^5 |
| Malta | 4.3×10^5 |

- (a) Work out the difference between the population of China and the population of Germany.
Give your answer in standard form.

$$\text{China : } 1.4 \times 10^9 = 140 \times 10^7$$

$$\begin{aligned} \text{Difference : } 140 \times 10^7 - 8.2 \times 10^7 & \\ = (140 - 8.2) \times 10^7 & \text{ (1)} \\ = 131.8 \times 10^7 & \\ = 1.32 \times 10^9 & \text{ (1)} \end{aligned}$$

$$\begin{array}{r} 1.32 \times 10^9 \\ \hline (2) \end{array}$$

Given that

$$\text{population of Fiji} = \frac{1}{k} \times \text{population of Sweden}$$

- (b) work out the value of k .
Give your answer correct to the nearest whole number.

$$\text{Fiji} = 9.1 \times 10^5$$

$$\text{Sweden} = 9.9 \times 10^6 = 99 \times 10^5$$

$$9.1 \times 10^5 = \frac{1}{k} \times 99 \times 10^5$$

$$k = \frac{99 \times 10^5}{9.1 \times 10^5} \text{ (1)}$$

$$= 11 \text{ (1)}$$

$$k = \frac{11}{(2)}$$

(Total for Question 5 is 4 marks)

- 6 The table gives the length of the coastline, in kilometres, of each of five oceans.

| Ocean | Length of coastline (km) |
|----------|--------------------------|
| Arctic | 4.539×10^4 |
| Atlantic | 1.119×10^5 |
| Pacific | 1.357×10^5 |
| Indian | 6.653×10^4 |
| Southern | 1.797×10^4 |

$$11.19 \times 10^4$$

$$13.57 \times 10^4$$

- (a) Which ocean has the greatest length of coastline?

Pacific ①

(1)

- (b) Calculate the difference between the length of the Atlantic Ocean's coastline and the length of the Southern Ocean's coastline.

Give your answer in standard form.

$$11.19 \times 10^4 - 1.797 \times 10^4 \quad \text{①}$$

$$= (11.19 - 1.797) \times 10^4$$

$$= 9.393 \times 10^4 \quad \text{①}$$

$$9.393 \times 10^4$$

km

(2)

(Total for Question 6 is 3 marks)

- 7 (a) Write 2840000000 in standard form.

$$2.84 \times 10^9 \quad (1)$$

$$2.84 \times 10^9$$

(1)

- (b) Write 2.5×10^{-4} as an ordinary number.

$$\underline{2.5 \times 10^{-4}} = 0.00025$$

(1)

$$0.00025$$

(1)

(Total for Question 7 is 2 marks)

8 (b) Work out $\frac{9.6 \times 10^{141} + 6.4 \times 10^{140}}{3.2 \times 10^{16}}$

Give your answer in standard form.

$$= \frac{9.6 \times 10^{141} + 6.4 \times 10^{140}}{3.2 \times 10^{16}}$$

$$= \frac{9.6 \times 10^{141} + 0.64 \times 10^{141}}{3.2 \times 10^{16}}$$

$$= \frac{10.24 \times 10^{141}}{3.2 \times 10^{16}} \quad (1)$$

$$= \frac{10.24}{3.2} \times 10^{141-16} \quad (1)$$

$$= 3.2 \times 10^{125} \quad (1)$$

$$\frac{3.2 \times 10^{125}}{(3)}$$

(Total for Question 8 is 3 marks)

- 9 The table gives information about the population, correct to 2 significant figures, of each of five cities in 2018

| City | Population (2018) |
|-----------|-------------------|
| Ahmedabad | 7.7×10^6 |
| Barcelona | 5.5×10^6 |
| Chicago | 8.8×10^6 |
| Lagos | 1.3×10^7 |
| Tokyo | 3.7×10^7 |

- (a) Write 8.8×10^6 as an ordinary number.

8 8 0 0 0 0 0 0

8 8 0 0 0 0 0 0 ①

(1)

- (b) Which of these cities had the least population in 2018?

Barcelona ①

(1)

- (c) Work out the difference between the population of Tokyo and the population of Ahmedabad in 2018

Give your answer in standard form correct to 2 significant figures.

$$\text{Tokyo} = 37 \times 10^6$$

$$\text{Ahmedabad} = 7.7 \times 10^6$$

$$\text{Difference: } (37 - 7.7) \times 10^6 \quad \text{①}$$

$$= 29.3 \times 10^6$$

$$= 2.9 \times 10^7 \quad \text{①}$$

$$2.9 \times 10^7$$

(2)

(Total for Question 9 is 4 marks)

10 (a) Write 0.000089 in standard form.

$$\frac{8.9 \times 10^{-5} \text{ (1)}}{(1)}$$

(b) Write 8.34×10^4 as an ordinary number.

$$\frac{83\,400 \text{ (1)}}{(1)}$$

(Total for Question 10 is 2 marks)

- 11 (a) Write 5×10^4 as an ordinary number.

$$\frac{50\ 000}{(1)} \quad (1)$$

- (b) Write 0.00006 in standard form.

$$\frac{6 \times 10^{-5}}{(1)} \quad (1)$$

- (c) Work out $(4 \times 10^{512}) \div (1.6 \times 10^{700})$
Give your answer in standard form.

$$\frac{4}{1.6} \times 10^{512-700} \quad (1)$$

$$= 2.5 \times 10^{-188} \quad (1)$$

$$\frac{2.5 \times 10^{-188}}{(2)} \quad (2)$$

(Total for Question 11 is 4 marks)

12

$$a = 4.2 \times 10^{-24}$$

$$b = 3 \times 10^{145}$$

Work out the value of $a \times b$

Give your answer in standard form.

$$(4.2 \times 3) \times 10^{-24+145} \quad \textcircled{1}$$

$$= 12.6 \times 10^{121}$$

$$= 1.26 \times 10^{122} \quad \textcircled{1}$$

$$1.26 \times 10^{122}$$

(Total for Question 12 is 2 marks)

13 (a) Write 9.32×10^{-5} as an ordinary number.

$$0.0000932 \quad \textcircled{1}$$

(1)

(b) Work out $3 \times 10^5 - 6 \times 10^4$

Give your answer in standard form.

$$\begin{aligned} & 3 \times 10^5 - 0.6 \times 10^5 \\ & = 2.4 \times 10^5 \end{aligned}$$

$$2.4 \times 10^5 \quad \textcircled{2}$$

(2)

(c) Work out $(3 \times 10^{55}) \times (6 \times 10^{65})$

Give your answer in standard form.

$$\begin{aligned} & 3 \times 6 \times 10^{55+65} \\ & = 18 \times 10^{120} \\ & = 1.8 \times 10^{121} \end{aligned}$$

$$1.8 \times 10^{121} \quad \textcircled{2}$$

(2)

(Total for Question 13 is 5 marks)

- 14 (a) Write 6.25×10^{-4} as an ordinary number.

$$0.000625 \quad (1)$$

(1)

- (b) Work out $(2.4 \times 10^{12}) \div (9.6 \times 10^4)$
Give your answer in standard form.

$$\frac{2.4}{9.6} \times 10^{12-4}$$

$$= 0.25 \times 10^8 \quad (1)$$

$$= 2.5 \times 10^7 \quad (1)$$

$$2.5 \times 10^7$$

(2)

(Total for Question 14 is 3 marks)

- 15 (a) Write 5.6×10^{-3} as an ordinary number.

$$0.0056 \times 10^{-3}$$

$$0.0056 \quad (1)$$

(1)

- (b) Work out $\frac{6 \times 10^3}{2.1 \times 10^{-4} + 9 \times 10^{-5}}$

Give your answer in standard form.

$$2.1 \times 10^{-4} + 0.9 \times 10^{-4} = 3 \times 10^{-4}$$

$$\frac{6 \times 10^3}{3 \times 10^{-4}} = \frac{6}{3} \times 10^{3-(-4)} \\ = 2 \times 10^7 \quad (1)$$

$$2 \times 10^7$$

(2)

(Total for Question 15 is 3 marks)

- 16 (b) Find 4% of 4.5×10^{157}
Give your answer in standard form.

$$\begin{aligned} & 0.04 \times 4.5 \times 10^{157} \quad (1) \\ & = 4 \times 10^{-2} \times 4.5 \times 10^{157} \\ & = 4 \times 4.5 \times 10^{-2+157} \\ & = 18 \times 10^{155} \quad (1) \\ & = 1.8 \times 10^{156} \quad (1) \end{aligned}$$

$$1.8 \times 10^{156}$$

(3)

(Total for Question 16 is 3 marks)

17 (a) Write 76000000 in standard form.

$$7.6 \times 10^7 \quad \textcircled{1}$$

(1)

(b) Write 5.4×10^{-4} as an ordinary number.

$$0.00054 \quad \textcircled{1}$$

(1)

(Total for Question 17 is 2 marks)